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DEFENSE SYSTEMS MANAGEMENT COLLEGE



PROGRAM MANAGEMENT COURSE INDIVIDUAL STUDY PROGRAM

CLASS V MODIFICATION MANAGEMENT AND PLANNING:

A GUIDE FOR THE AFSC PROGRAM MANAGER OF
LESS-THAN-MAJOR SYSTEMS

STUDY PROJECT REPORT
PMC 77-1

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FORT BELVOIR, VIRGINIA 22060

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Individual Study Program
Study Project Report
Prepared as a Formal Report

Defense Systems Management College
Program Management Course
Class 77-1

by

Reginald M. Cilvik
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May 1977

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Lt Col J. Arcieri

This study project report represents the views, conclusions, and recommendations of the author and does not necessarily reflect the official opinion of the Defense Systems Management College or the Department of Defense

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle)		5. TYPE OF REPORT & PERIOD COVERED
CLASS V MODIFICATION MANAGEMENT AND PLANNING: A GUIDE FOR THE AFSC PROGRAM MANAGER OF LESS-THAN-MAJOR SYSTEMS		Student Project Report 77-1
7. AUTHOR(s)		6. PERFORMING ORG. REPORT NUMBER
REGINALD M. CILVIK		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
DEFENSE SYSTEMS MANAGEMENT COLLEGE FT. BELVOIR, VA 22060		
11. CONTROLLING OFFICE NAME AND ADDRESS		12. REPORT DATE
DEFENSE SYSTEMS MANAGEMENT COLLEGE FT. BELVOIR, VA 22060		77-1
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		13. NUMBER OF PAGES
		57
		15. SECURITY CLASS. (or this report)
		UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report)		
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<div style="border: 1px solid black; padding: 5px; display: inline-block;"> DISTRIBUTION STATEMENT A Approved for public release; Distribution Unlimited </div>		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
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DEFENSE SYSTEMS MANAGEMENT COLLEGE

STUDY TITLE: CLASS V MODIFICATION AND PLANNING: A GUIDE FOR THE AFSC
PROGRAM MANAGER OF LESS-THAN-MAJOR SYSTEMS

STUDY PROJECT GOALS:

- Identify, define, summarize, and evaluate Class V modification and budget planning, and the implications for the AFSC program manager of less-than-major systems.
- Identify, summarize, and evaluate interface requirements for Class V modifications between the AFSC program office, AFLC, and HQ USAF agencies. Provide recommended Class V modification guidelines for the AFSC program manager of less-than-major systems.

STUDY REPORT ABSTRACT:

The primary goal of the report is to provide the AFSC program manager (PM) of less-than-major systems with an understanding of the importance of early planning, interface required between the AFSC PM, AFLC agencies, and higher headquarters; and the impact of the PM in the implementation of Class V modifications.

This study project was accomplished in the following manner. First, a summary of the current DOD and Air Force documentation provided data for basic authority and established policies for Class V modifications. The report outlines typical interfaces between the AFSC program office, AFLC agencies, and HQ USAF that are required for AFLC-managed Class V modifications. Second, a brief overview of the DOD Planning, Programming, and Budgeting System (PPBS) is provided; and the importance of lead timing for the modification budget submission within the PPBS is illustrated. The different procurement appropriations, Class V modification budget program monies, and planning documentation are summarized. Third, problem areas in modification management are discussed based on interviews with AFSC and AFLC personnel. Fourth, general guidelines are established to assist the AFSC PM to more effectively accomplish his program through better understanding of the Class V modification process. Such improved understanding should facilitate the transition from an RDT&E program to a Class V modification program. Further study of large complex modification management and the current organization structure for accomplishing Class V modifications is recommended.

The report is not intended as a replacement for existing directives; it should be used as a reference text by AFSC program management personnel.

SUBJECT DESCRIPTORS: CLASS V MODIFICATIONS, CONFIGURATION MANAGEMENT

NAME, RANK, SERVICE

Reginald M. Cilvik, Lt Col, USAF

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DATE

May 1977

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EXECUTIVE SUMMARY

As an Air Force Systems Command program manager of a less-than-major system, you may find yourself faced with accomplishment of the production and installation phases via a Class V modification under AFLC management. AFLC-managed Class V modifications involving the acquisition of new equipment under AFSC management require considerable support from the AFSC program manager for successful implementation. To adequately plan the Class V modification, you must understand Air Force Class V modification policy, the budgeting and approval cycle for modifications, and the role of AFLC in modification management. Thus it is the objective of this information paper to provide the AFSC program manager with an understanding of the authority and establishment of Class V modification policy, the process and documentation required for modification approval, and recommended guidelines for modification planning.

The key to the program manager's success is early planning and understanding the impact of his direct responsibilities in planning and implementing the Class V modification. Direct teamwork and interface must be established with the AFLC system manager and item managers. Lines of communication and flow of information must be continuous between the AFSC program manager, AFLC organizations, and higher headquarters.

The information and data in this paper have been extracted from appropriate DOD and Air Force Directives, and augmented by interviews with personnel in HQ USAF, HQ AFLC, Warner Robins ALC, Ogden ALC, HQ AFSC, and the Aeronautical Systems Division.

This paper is not intended as a replacement for existing directives; it should be used as an information or reference text by AFSC personnel involved in Class V modification management.

ACKNOWLEDGMENTS

The basic purpose of this paper was supported by personnel concerned with Class V modifications within HQ AFLC and the Aeronautical Systems Division, Wright-Patterson AFB, Ohio; Warner Robins ALC, Robins AFB, Ga; Ogden ALC, Hill AFB, Utah; HQ AFSC, Andrews AFB, Md; and HQ USAF, Washington, DC. I am most grateful for their cooperation and assistance.

I wish to extend special appreciation to my wife, Jeanie, for the long hours spent typing this report, and to Lt Colonel Leon Huffman, whose experience provided significant insight into Air Force modification management.

SECTION I

INTRODUCTION

PURPOSE: The purpose of this report is to provide the AFSC Program Manager (PM) of less-than-major systems with fundamental knowledge of the Class V modification process and related requirements. A Class V modification (1:8)¹ to in-service aircraft is implemented to (a) provide a new or improved operational capability, or (b) accomplish an assigned mission that cannot be accomplished with the present configuration. Every year several hundreds of millions of dollars are spent on new or improved operational capabilities to in-service Air Force aircraft via Class V modifications. The majority of these new capabilities are being developed by the AFSC product divisions. Thus an understanding by the AFSC PM of the Class V modification process early in the RDT&E phase of his program will greatly facilitate the successful planning, production, and installation of his system.

SCOPE: This report is limited to the essential elements of Class V modification planning, and includes the authority for the process, background terms, and definitions. A brief overview of the AFLC organization structure and role in modification planning and implementation is presented. Procedures for preparing and submitting the modification budget through AFLC to HQ USAF are provided. A brief review of the HQ USAF process for budgeting and approval of the modification program is given. AFSC and

¹This notation will be used throughout the paper for sources of quotations and major references. The first number is the source listed in the bibliography. The second number is the page in the reference.

AFLC command perceptions and observations of intercommand coordination difficulties with the existing Class V modification process are also addressed. This report is concluded with recommended guidelines for the PM of less-than-major systems when planning his program for production and installation by Class V modification procedures. Throughout the report, an example is used to illustrate a modification structure requiring the involvement and support of the AFSC PM. This example will be referenced frequently, and assumes that the AFSC PM is completing development and test of a new warning system. The system is to be installed in B52 aircraft by a Class V modification to increase the aircraft warning capabilities.

SECTION II

AUTHORITY FOR CLASS V MODIFICATIONS

Several DOD and Air Force directives govern modifications to Air Force aircraft. A summary of the principle directives follow.

DOD Directive 5010.19, Configuration Management. This directive established DOD policies governing the configuration management of systems, equipments, and other designated material items, referred to as configuration items (CI). Configuration management is cited as a discipline applying administrative direction and surveillance to (1) identify the functional and physical characteristics of a CI, (2) control change to these characteristics, and (3) record and report change processing and implementation status (7:2). A primary objective of configuration management is to introduce at the appropriate time the degree and depth of configuration control necessary for production and logistic support. Configuration items developed at the government's expense shall be subject to configuration management upon approval for engineering development. Once initiated, configuration management continues through the CI's life cycle until the CI is removed from the operational inventory. Configuration control shall be exercised at all echelons of the DOD and at Defense-Industry interfaces on the basis of the functional or product configuration identification appropriate to the management echelon concerned, and to the stage of the CI life cycle. Changes in the configuration of a CI shall be limited to those which are necessary or offer benefit to the DOD. Configuration status accounting information necessary to manage the configuration effectively and economically shall be recorded and reported.

AFR 65-3, Configuration Management. AFR 65-3 is the Air Force implementation of a joint DOD Services/Agency requirement for configuration management of weapon systems and equipments. Configuration management identifies, controls, accounts for, and audits the functional and physical characteristics of systems, equipments, and designated material items operated and supported by the DOD (2:1-1). A configuration item can be a weapon system, subsystem, or other equipment. This regulation requires that CIs entering the Air Force inventory have a configuration identification, a process for orderly change control, status accounting, and audit. Configuration identification is established through technical documentation, structuring of CI specifications, and establishment of CI baselines. The product baseline is required prior to production to prescribe the necessary "build to" form, fit, and functional requirements. Once configuration identification of the CI has been firmly established (usually during the engineering development phase), further control of changes to the CI is accomplished by a Configuration Control Board (CCB) formally established for that purpose. The CCB acts on all proposed changes that affect the item configuration. Changes to the CI baseline are proposed by Engineering Change Proposals (ECPs) and are submitted to the CCB for approval. Configuration status accounting is required to provide traceability of the configuration baselines, and changes to technical documentation needed to control the item configuration. Configuration audits are conducted to verify compliance with specification and control requirements. A functional configuration audit (FCA) is conducted to assure that the technical documentation accurately reflects the CI functional characteristics, and is usually conducted on prototype or preproduction

configurations of the item proposed for production. The physical configuration audit (PCA) is a means of establishing the product baseline, and is conducted to insure that the CI matches the detailed specifications and drawings to be used in production. The program manager's approval of the CI specification, and satisfactory completion of the PCA results in the establishment of the product baseline for the CI.

The PM should note that AFR 65-3 highlights the requirement for configuration management as a discipline, with emphasis on configuration identification, change control, status accounting, and audit. Configuration items are usually selected for configuration management during engineering development and a product baseline is established prior to production. Once configuration management is applied, then further configuration changes affect all documentation associated with the item under configuration control, and may affect its form, fit, and function. Numerous configuration changes may result in loss of item identification unless change documentation is closely tracked.

AFR 57-4, Retrofit Configuration Changes. This regulation outlines Air Force policy, assigns responsibilities, and tells how to obtain approval for modification of in-service systems and equipments. It also establishes basic criteria for assigning modification program management. It implements the configuration control portions of DODD 5010.19 and related configuration management policies of AFR 65-3. The regulation also establishes five classes of modifications (1:8). Since the scope of this paper is limited to Class V modifications, the portions of the regulation pertaining to Class V modifications are emphasized:

- Terms and definitions peculiar to the establishment of modification programs may be strange and unfamiliar to the PM. The glossary of terms at Appendix A are suggested for review at this time.

- AFR 57-4 is the primary reference document for modification policy in the Air Force; it delineates HQ USAF and major command responsibilities for justifying, submitting, approving, and accomplishing Class V modifications to in-service aircraft.

- Class V modifications require HQ USAF approval prior to implementation. Approval is contingent upon HQ USAF validation of a Required Operational Capability (ROC) from the primary using command that substantiates the need for the modification. The priority (ranking) of the Class V modification by the using command compared to other proposed Class V modifications within that command is an indication to HQ USAF of its relative importance when competing for limited funds available for all Class V modifications to be funded. A Program Management Directive (PMD) is required to approve the modification. HQ USAF also allocates funding and modification management responsibility to the appropriate major command (AFSC or AFLC).

- Either AFLC or AFSC may be authorized by HQ USAF to manage Class V modification programs. The majority of Class V modifications to in-service weapon systems are usually directed to AFLC for management, with AFSC acting in a supporting role. Class V modifications may be directed to AFSC when Program Management Responsibility Transfer to AFLC has not occurred, or when the modification is comparable to the development of a new weapon system with a new or alternate mission capability. Such complex modifications usually require substantial development and integration

efforts, and result in a new Mission Designator Series (MDS) for the weapon system (e.g., F-111A to EF-111A). In general, however, when AFSC develops a new subsystem or equipment for installation in in-service aircraft, AFLC is usually designated as the modification manager with AFSC support (1:9). (In the illustrative example, the warning system under development by the AFSC PM is to be installed by a Class V modification under AFLC management with AFSC support.)

AFR 57-4 also establishes other policies for Class V modifications:

- All Class V modifications will be documented with a time compliance technical order (TCTO).
- A Configuration Control Board (CCB) and appropriate documentation will be maintained to insure configuration changes generated by the modification are recorded.
- Modification kits must be kit proofed (trial installation) and related TCTOs verified.
- Appropriate logistics support action will be taken along with the retrofit change action. AGE (support equipment), spares, and technical data will be determined and provisioned or prepared to be delivered at the same time as the end item equipments.
- Action will be taken to satisfy the early need for trained personnel to operate the changed basic system and maintain any new subsystem or equipment.
- Advance planning is required for facilities changes required by the proposed configuration changes generated by the Class V modification.

- Prepare budgetary cost information (BCI), Modification Proposal and Analysis (MPA), and advance procurement plans (APP) for the modification when directed by HQ USAF per joint AFSC/AFLC directives.

The modification manager is thus charged by the above factors to consider the total scope of a Class V modification program, which includes production, installation, support elements, training, and facilities. It is therefore important that the PM seek early determination of the appropriate major command to be assigned modification management responsibility. In cases such as the illustrative example, the Class V modification would normally be directed to AFLC for management with the AFSC program management office (PMO) acting in a supporting role. The mutual acceptance of modification management responsibilities by both the program manager and the modification manager should be established during RDT&E and early planning stages of the Class V modification to preclude misunderstanding of respective roles in the accomplishment of the modification program.

SECTION III

AFLC POLICY AND CLASS V MODIFICATION MANAGEMENT

POLICY

AFLCR 57-21, Modification Program Approval, implements AFR 57-4 and provides policies and procedures for the documentation, processing, and approval of Air Force modification programs. It expands interface requirements between AFSC and AFLC and implements joint modification procedures established in AFLCR/AFSCR 57-3. Important policy provisions (5:5-1, 3) for Class V modifications are:

- Class V modification programs are approved by HQ USAF, and are directed and funded on the basis of cost, schedule, and logistics requirements supplied in the Modification Proposal and Analysis (MPA). The MPA must reflect the most realistic cost estimates possible for the total cost of the modification program.

- Class V modifications that have a known cost increase of \$200,000 or 20% of the approved cost, whichever is less, will be held in abeyance until HQ USAF direction is provided.

- Close working relationships will be established with other agencies that have engineering or procurement responsibility for all or a part of a Class V modification.

- As a general policy, trial installation of an approved Class V modification will be accomplished prior to the release of funds for the procurement of retrofit modification kits. Each Class V modification will consider the applicability of AFR 80-14 (Test and Evaluation).

- New equipment introduced into the Air Force inventory as a result of a Class V modification is to be qualified prior to release for inclusion in modification kits. New parts or components must be provisioned to assure concurrent spare parts, support equipment, training equipment, and data for the modified configuration.

- A CCB will be established at each Air Logistics Center (ALC) and as otherwise specified for the purpose of exercising configuration control over the modification effort.

- Modifications to equipment items (airborne and ground) that require modification to the parent system (e.g., aircraft structure) will be approved or disapproved first by the item manager ALC CCB and then by the parent system manager. Such modifications are under the overall control of the parent system ALC and will be forwarded to the HQ AFLC CCB by the parent system ALC (5:6-5). Modifications to systems which require the replacement of an existing component with a new or improved component will be given final approval or disapproval by the parent system ALC CCB.

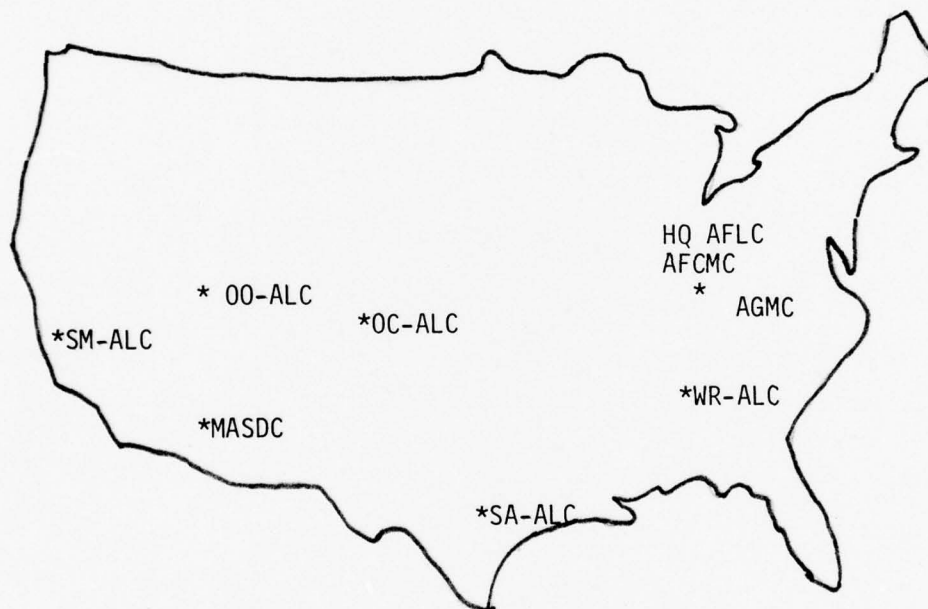
The PM should notice that the AFLC implementation of AFR 57-4 establishes relatively stringent requirements as the price of entry into a Class V modification. The MPA is established as the governing document for program approval, and cost growth restrictions for the modification are emphasized. General requirements are further established for qualification and prototype testing prior to release of production kits. These requirements are introduced for the purpose of assuring that the Class V modification proceeds with minimum technical risk and probability of cost growth. AFLCR 57-21 further emphasizes the total program scope that the

modification must encompass for effective support of modified end item hardware when it is deployed for operational use.

AFLC ORGANIZATION FOR CLASS V MODIFICATION MANAGEMENT.

Figure 1 shows the AFLC organizational structure and some of the assigned responsibilities for major aircraft, missile systems, and assigned Technology Repair Centers.

Figure 1



AIR LOGISTICS CENTERS (ALCs)

Ogden ALC (OO-ALC), Hill AFB, Utah: Major mission assignments include F/RF-4 and F/RF-101 aircraft, and the Bomarc, Titan II, Minuteman, Maverick, and Walleye missiles. Technology Repair Center activities include air munitions, missile components, landing gear, training, and simulation equipment.

Oklahoma City ALC (OC-ALC), Tinker AFB, Oklahoma: Major mission assignments include A-7, B-1, B-52, C/KC-97, C/KC/RC-135, VC-137B, E-3A, and E-4A aircraft; Short Range Attack Missiles and other missiles; J-33, J-57, J-79 jet engines, and several other jet engines. Technology Repair Center activities include hydraulic transmissions, oxygen components, engine instruments, and automatic flight control instruments.

San Antonio ALC (SA-ALC), Kelly AFB, Texas: Major mission assignments include C-5A, C/VC-6A, C-9A, C-131, F-5, F-106, T-38, O-2A, OV-10, and other aircraft; J-52, J-60, J-65, J-69, J-85, F/PW-100, TF-34, and other jet engines. Technology Repair Center activities include electronic and electromechanical aerospace ground equipment, and nuclear components.

Warner Robins ALC (WR-ALC), Robins AFB, Georgia: Major mission assignments include B-57, C-7A, C-47, C-141, F-15, and utility aircraft; helicopters, air-to-air and anti-radiation missiles; and target drones. Technology Repair Center activities include airborne electronics, propellers, portable buildings, and gyroscopes.

Sacramento ALC (SM-ALC), McClellan AFB, California: Major mission assignments include A-1, A-10, T-39, F-100, F-105, F/FB-111, and Short Takeoff and Landing aircraft. Technology Repair Center activities include ground communications electronics, fluid-driven hydraulic accessories, and flight control instruments.

SPECIALIZED ORGANIZATIONS

Aerospace Guidance and Metrology Center (AGMC), Newark AFS, Ohio: This center repair inertial guidance and navigation systems for aircraft and missiles, and aircraft gyroscopes. It also manages the Air Force

metrology and calibration program and hosts the Air Force measurement standards laboratory.

Air Force Contract Maintenance Center (AFCMC), Wright-Patterson AFB, Ohio:

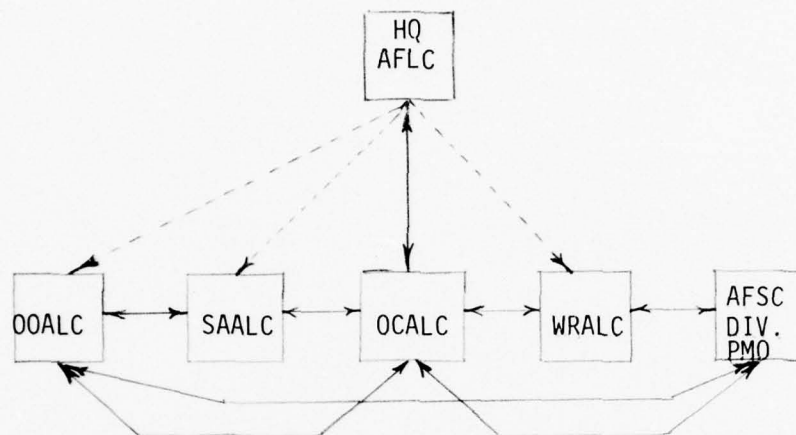
With detachments located around the world, this center administers approximately \$800,000,000 annually for depot maintenance contracts at stateside and overseas locations.

Military Aircraft Storage and Disposition Center (MASDC), Davis-Monthan

AFB, Arizona: This center manages the storage, reclamation, return to flying status, and disposition of all aircraft not immediately required in the DOD operational inventory.

AFLC has its headquarters at Wright-Patterson Air Force Base, Ohio. Five large industrial facilities--called Air Logistics Centers--and three specialized organizations perform the command's operational functions (6:1). Each system manager is assigned total weapon system configuration management and support responsibility for weapon systems that have completed Program Management Responsibility Transfer from AFSC. Under AFLC organizational structure, the parent system manager (SM) has overall control of Class V modifications affecting the weapon system for which the SM is responsible. The SM takes lead action in the preparation and implementation of the total Class V modification program, with the assistance of appropriate AFLC item managers and any supporting AFSC product divisions. The typical organizational structure for the management of the modification in the illustrative warning system example is shown in Figure 2.

Figure 2



A review of Figure 2 should indicate to the PM that the warning system to be installed in the B-52 aircraft by Class V modification procedures would be under the overall management of the B-52 SM at Oklahoma City ALC (OC-ALC). This example further illustrates that (a) the B-52 SM requires significant information from several lateral agencies (three ALCs and the PMO), and (b) timely support is required from all affected agencies for effective accomplishment of the modification. This extensive coordination of significant information is thus the reason for the emphasis in AFLCR 57-21 and AFLCR/AFSCR 57-3 for close working relationships between all agencies involved in a modification program. It should also be remembered that AFLC mission assignment responsibilities for weapon systems and equipment items support are worldwide in scope. The SM is further responsible for the total weapon system configuration management which may entail the integration or installation of other

concurrent modifications. Installation of concurrent modifications frequently contributes to the SM's difficulty in maintaining timely and orderly accomplishment of Class V modifications and weapon system configuration control.

SECTION IV

BUDGETING FOR THE CLASS V MODIFICATION PROGRAM

This section of the report relates the preparation of the Class V modification budget and timing of the budget submission to the overall budgeting process at HQ USAF and DOD level. The BCI and MPA cost documentation for modifications are described in AFR 57-4, and are directed for preparation to AFLC and AFSC, as appropriate, to obtain inputs to the Planning, Programming, and Budgeting System (PPBS) at HQ USAF. The PPBS is a formal and structured system within each service for submission of the service defense budget to OSD and Congress. An elementary understanding of the different phases of the PPBS is essential to the understanding of lead timing for budgetary cost inputs to HQ USAF.

The Planning, Programming, and Budgeting System (PPBS). The PPBS was introduced into the DOD in the 1960s and has evolved to provide an orderly planning and identification of the services' defense budgets. Only a brief overview and key areas of a very complex process will be presented here (8:1-11). The essential phases of the PPBS are shown in Figure 3. From this figure, it can be seen that the May-December planning phase for a particular fiscal year budget starts approximately 19 months in advance of the actual budget submission. The purpose of the planning phase of the PPBS is to determine forces and support level objectives, and to specify future force level objectives to accomplish mission requirements. The Joint Strategic Operation Plan I (JSOP I), a mid-range planning document, is submitted by the Joint Chiefs of Staff (JCS) to OSD in June of each year, and contains military strategy and force structure requirements for a 3 to 10 year projection into the future. In response to the JSOP I and national

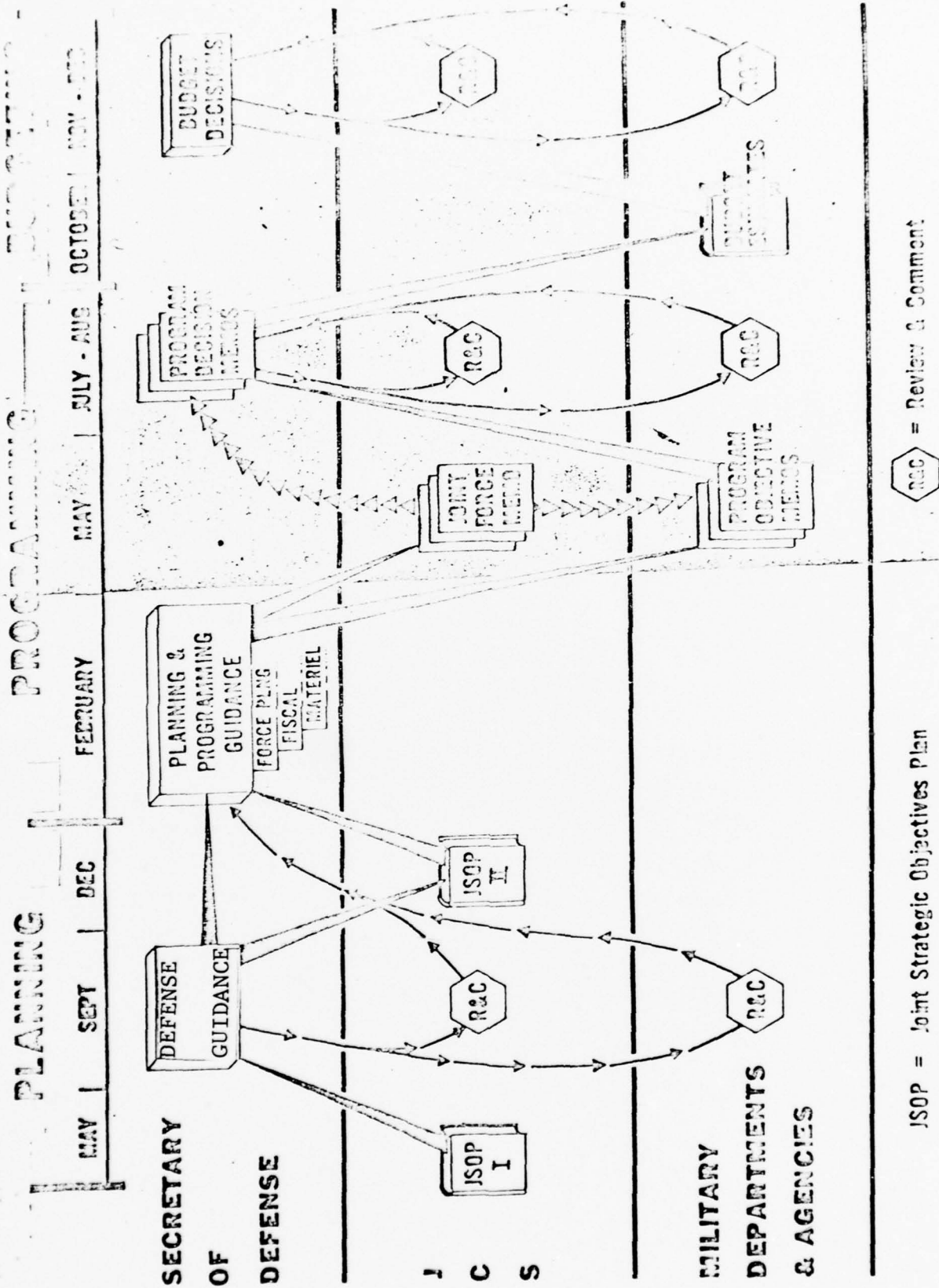


Figure 3

security objectives, OSD issues, in the September period, Defense Guidance which provides policy and force planning direction to the services for action, review, and comment. The JSOP II is a second mid-range planning document submitted in the December time period in response to Defense Guidance that provides an analysis and supporting rationale to OSD for proposed force levels and mixes. The planning phase of the PPBS is fiscally unconstrained and thus reflects the JCS desired programs and force structure levels.

The programming phase for the Fiscal Year (FY) budget is conducted from February - September. The purpose of the programming phase is to translate the services' force levels and support requirements into manpower and materiel resources requirements. In the February period, OSD issues the Planning and Programming Guidance (PPG) based on previous Defense Guidance and JSOP II inputs. It is important to note that the PPGM contains fiscal guidance for the FY budget submission. The service budget must remain within the ceilings set. The PPG further provides additional force guidance and an outline for accomplishment of the Program Objectives Memorandum (POM). The POM is the primary program-budget instrument for each of the services, and is a statement of the services' position to OSD regarding proposed programs to meet force structures and objectives within the fiscal ceiling and force guidance established by the PPGM. The Class V modification budget must be in the POM submittal, or the modification program will be slipped to the next FY. The submission of the services' POM to OSD in May generates Issue Papers between OSD and the services regarding programs contained in the May POM submission. OSD, after review of issues and services' responses regarding the POM submittal, issues Program Decision Memos (PDM) to each service stating OSD decisions regarding

the services proposed FY programs. After the services' review, comment, and reclama to the OSD PDM, OSD issues any final program adjustments in Amended Program Decision Memos (APDM) in the August - September period. The APDM thus documents remaining issues between OSD and the services, and provides final direction to the services on proposed FY programs outlined in the POM submission.

The purpose of the budgeting phase of the PPBS is to translate approved resources (manpower and material) reflected in the APDM into time-phased financial requirements. The budgeting phase is conducted between the October and December period. The budget is submitted by budget appropriation (RDT&E, Procurement, Military Construction, Personnel, Operations and maintenance, Military Assistance, Other) from the Service Secretary to the OSD Comptroller in the October - December period. A joint Air Force, OSD, and OMB review of the service budget submission is also convened during this period to insure that the budget can be acted upon and submitted to Congress in January for inclusion in the President's budget. The President's budget is submitted to Congress the last week in January after Congress has convened (16.101). After extensive reviews of the Federal budget by congressional committees and enactment of budget legislation, apportionment of the Federal budget is accomplished by OMB to the DOD and other Federal departments near the beginning of the fiscal year. The services' portion of the DOD budget is then allocated through the major commands to field activities for obligation and expenditure.

The PM should note that the PPBS is formally structured and complex, that programming the FY budget submission requires significant

lead timing, and that the modification budget must be contained in the appropriate POM submission.

Procurement Appropriations for Class V Modifications. Congress authorizes the U. S. Air Force funds resources for the acquisition, implementation, operation, maintenance, and support of its mission functions and activities. Prior to FY 1971, the Aircraft, Missile, and Other procurement appropriations were "no year" accounts; i.e., available for obligation for three years. Appropriations by major category and subsidiary fund accounts (16:52, 53) are:

- 3010 Aircraft Procurement. Provides for fabricating and procuring: aircraft weapon systems, modifications, direct ground support equipment, aircraft industrial facilities, investment type spares, war consumables, miscellaneous aircraft requirements, final destination transportation, technical data.

- 3020 Missile Procurement. Provides for fabricating and procuring: missile weapon systems, operational space systems, modifications, investment type spares, component improvements, missile industrial facilities, miscellaneous missile requirements, first destination transportation, site activation, technical data.

- 3080 Other Procurement. Provides for fabricating and procuring: direct and indirect ground support material, other industrial facilities, equipment modifications, investment type spares, and first destination transportation.

Since a major portion of Class V modifications involve in-service aircraft, the 3010 aircraft procurement appropriation is further broken down into the following budget programs:

BP 10 0000 Aircraft Weapon Systems
 BP 11 0000 Modifications
 BP 12 0000 Common Aerospace Ground Equipment (Support Equipment)
 BP 13 0000 Component Improvement
 BP 14 0000 Aircraft Industrial Facilities
 BP 15 0000 Replenishment Spares and Repair Parts
 BP 16 0000 Initial Spares and Repair Parts
 BP 17 0000 War Consumables
 BP 18 0000 Procurement other than USAF
 BP 19 0000 Other Charges
 BP 30 1000 First Destination Transportation
 BP 99 3000 Appropriation Refunds on Transportation of Persons and Things

BP 1000 funds are used for the procurement of aircraft weapon systems (e.g., F-15 aircraft) under the acquisition of an aircraft system program office (SPO) in AFSC. Class V modifications to aircraft weapon systems can occur while the aircraft is still in production, after the aircraft system has been delivered to operational units, or both. Thus Class V modifications can affect aircraft in production (production effectivity) as well as retrofit of operationally deployed aircraft. Once the aircraft weapon system has transitioned to the AFLC SM for management, the weapon system configuration control (and thus the Class V modification management responsibility) then resides with AFLC. As previously noted, however, Class V modifications involving extensive development may still be directed to AFSC for management by HQ USAF (1:9).

The PM is probably aware that AFSC expends funds from the RDT&E BP 3600 appropriation for systems development, test, and evaluation. In contrast, Class V modification funds have different "colors" or budget programs, for production, installation, and support. The major budget programs usually associated with Class V modifications to aircraft weapon systems are shown in Figure 4.

Figure 4

<u>Budget Program</u>	<u>Procures</u>
BP 1100	Group A kits, Group B kits, production engineering and tooling, technical data, testing, peculiar support equipment, mobile training sets, weapon system training simulator modification kits
BP 1200	Common Support equipment
BP 1600	Initial investment spares and repair parts
BP 1500	Replenishment spares (after initial spares provisioned)
BP 8500	Base maintenance and support equipment
BP 4921	Expense spares
BP 3400	Operations and maintenance of aircraft, installations, and facilities

The BP 1100 account comprises the major portion of funding for Class V aircraft modifications, and may constitute 50 to 80% of the total modification cost. The BP 1100 funds must be budgeted and authorized by HQ USAF for specific Class V modification programs. BP 1200, 1500, 1600, and 8500 funds are allocated to AFLC on a quarterly basis in support of

several different modifications. The BP 4921 is a stock fund for expense type items related to aircraft modifications, and operates under the revolving fund principle (16:61). The BP 1500 account is used to fund follow-on replenishment spares based on equipment field usage factors, and is, therefore, not normally chargeable to the total cost of a Class V modification program.

Budgetary Cost Information (BCI) for Class V Modifications. The PPBS has been shown to be formally structured, and it should now be obvious to the PM that significant lead times are involved for fiscal year budget planning. Advance planning of the modification budget is thus also required to meet the various phases of the PPBS.

For the illustrative warning system example, when should budget estimates be submitted for starting the modification, for example, in FY 1980? First the PM, in concert with the SM and the contractor, should project with reasonable confidence that combined development, test, and evaluation progress will be sufficiently complete to support an FY 1980 production for a Class V modification. Within HQ USAF, the Program Element Monitor (PEM), with the support of the major using command, establishes advocacy for the new modification. The validation of the new capability modification within HQ USAF is based on a required command-sponsored ROC, and is the responsibility of HQ USAF/RD. This validation is accomplished through the Air Staff Requirements Review Group (RRG) which is chaired by HQ USAF/RDQ. If the ROC is validated by the RRG, HQ USAF/XO establishes a priority listing of Class V modifications through the Priorities Review Committee (PRC) which is chaired by HQ USAF/PRP.

HQ USAF/LG then integrates all of the approved modifications for programming, budgeting, and implementation.

HQ USAF uses the BCI to prepare the Class V modification budget for submission to OSD, OMB, and Congress (1:25). For an FY 1980 start considered in the illustrative example, HQ USAF would direct AFLC with AFSC (PM) assistance to prepare and submit the BCI (usually within 30 - 45 days) in the October 1977 period for inclusion in the FY 1980 POM which is submitted in May 1978. The BCI would be prepared by the appropriate AFLC SM with support of AFLC item managers and the PMO as previously discussed and illustrated in Figure 2. The BCI (1:25) contains:

- Modification title, with cross reference to the PMD or ROC.
- Cost and schedules for:
 - Engineering, trial installation, test (cost and lead time)
 - Group A kits (number, cost, estimated lead time)
 - Group B kits (number, cost, estimated lead time)
- Cost by Budget Program
- First year cost by Budget Program
- Estimate by FY until program completion
- Grand total
- Remarks

It is Air Force policy that Class V modifications not be authorized solely on the basis of a BCI. An MPA is usually required to back up and provide more definitive cost information on modifications during the coordination and approval cycle within HQ USAF. BCI refinements or an MPA may be directed to further define program costs. Thus for an FY 1980 new start, HQ USAF, during the October 1977 to May 1978 period, must (a) include

the modification based on a validated ROC and its ranking on the priority list of all Class V modifications, and (b) submit the modification budget estimate by May 1978 to be included in the approved FY 1980 POM. If the FY 1980 POM does not contain the modification budget, the modification may be delayed until the next FY cycle provided it remains a valid requirement.

The Class V Modification Proposal and Analysis (MPA). The MPA is the primary documentation for controlling the modification program funds, schedules, and installations. Class V modifications over \$25,000,000 require a Modification Planning Supplement (MPS) and an Advance Procurement Plan (APP). The MPS integrates the elements of the MPA into a logical and coherent plan showing the overall implementation from approval to deployment. It discusses the item peculiar to the particular modification in sufficient detail to insure that the high risk aspects of the modification have been examined. The APP is prepared per ASPR 1-2100 and provides the procurement approach supporting the modification effort.

The MPA is essentially an analysis of the cost, schedule, and risk associated with the modification. It is the modification manager's equivalent to the program manager's Program Management Plan for program control, and is carefully prepared and documented on AFLC/AFSC Forms 44. MPAs are required for submission to HQ USAF within 90 days after directed by PMD. HQ USAF normally requires submittal of the MPA after IOT&E completion and approximately three months prior to the start of the FY in which the modification is initiated. In the illustrative example, the MPA would be submitted before 1 July 1979.

Prior to a discussion of AFLC/AFSC Forms 44, a reference to Figure 2 shows that various agencies are responsible for providing

Information to the modification manager for preparation of an MPA. Using the illustrative warning system example, typical information provided by various agencies to the B-52 SM at OC-ALC are shown in Figure 5.

Figure 5

<u>Agency</u>	<u>Function and Information Provided for MPA</u>
OC-ALC (B-52 SM)	<ul style="list-style-type: none"> -- Class V modification manager -- Provides installation schedule to all agencies -- Determines Group A, Group A spares, installation data -- Consolidates information from all agencies and prepares MPA
AFSC PM Office	<ul style="list-style-type: none"> -- Responsible agency for development of equipment, subsystem, peculiar support equipment, technical data -- Provides cost, lead time, and description of the subsystem and support equipment to all agencies -- Provides prototype test results and recommended production configuration to all agencies -- Provides to WR-ALC: <ul style="list-style-type: none"> ---Cost and lead time for Group B, peculiar support equipment, technical data, nonrecurring production engineering, tooling, and testing -- Provides to SA-ALC: <ul style="list-style-type: none"> ---Requirements for common equipment items ---Cost and lead times for Automatic Test Equipment and technical data -- Provides to OC-ALC: <ul style="list-style-type: none"> ---Prototype Group A configuration and structural modifications to accept the subsystem ---Installation data from prototype effort

Figure 5 (cont'd)

<u>Agency</u>	<u>Function and Information Provided for MPA</u>
AFSC PM Office (cont'd)	<ul style="list-style-type: none"> -- Provides to OO-ALC: <ul style="list-style-type: none"> ---Technical data affecting Weapon System Training Simulator modifications for subsystem simulation capability
WR-ALC	<ul style="list-style-type: none"> -- AFLC item manager for airborne subsystems and peculiar support equipment -- Provides to OC-ALC (B-52 SM): <ul style="list-style-type: none"> ---Cost and lead time for Group B, Group B spares, peculiar support equipment, testing, production engineering, tooling, data ---Group B spares projections and provisioning factors
SA-ALC	<ul style="list-style-type: none"> -- AFLC item manager for automatic test equipment (ATE) and common equipment items -- Provides to OC-ALC (B-52 SM): <ul style="list-style-type: none"> ---Cost and lead time for required ATE, common equipment, and associated data
OO-ALC	<ul style="list-style-type: none"> -- Weapon System Training Simulator (WSTS) modification manager -- Provides to OC-ALC (B-52 SM): <ul style="list-style-type: none"> ---Complete MPA for modification of WSTS to incorporate subsystem simulation capability

After review and approval of the MPA by both the OC-ALC and HQ AFLC CCB, the MPA is endorsed and forwarded to HQ USAF for approval. HQ AFLC controls and assigns the modification numbers for all Class V modification programs. A review of Figures 2 and 5 reveals that the significant information provided by the PMO to the IMs and SMs is a driving factor for accomplishment of the MPA. The cost of the Group B and support equipment under

the control of the PM in typical modifications may comprise 50 to 80% of the total modification cost. Additionally, the lead time required for Group B, data, and support equipment items further drives the installation and support schedules. These facts coupled with the flow of information within the Class V modification management structure thus invites discussion concerning the degree of effective management control the SM really has over Class V modifications, where management responsibilities are split between two major command organizations.

The SM is highly dependent on the timely support of the PMO and the affected AFLC IMs in preparation of MPAs. Although MPAs should be submitted within 90 days after PMD, experience has shown that submission of poorly prepared or late cost and schedule data to the SM results in considerable extension of the MPA preparation time required. Because the efforts of several agencies and considerable communication of information is required, many of the larger Class V modifications such as the B-52 Class V modification 2519 (B-52 ECM Improvement) are managed by a "task force" approach to more effectively control and coordinate the modification effort among participating agencies.

MPA Documentation (AFLC/AFSC Form 44). Since the MPA is the primary document required for approval, direction, and control of the modification, the analysis is detailed regarding quantities, schedule, and support elements required for the total program. The PM should note that the MPA reflects a total program submission using the full funding concept required under procurement appropriation guidelines. The MPA is documented on AFLC/AFSC Forms 44 (see Appendix B). AFLC/AFSC Forms 44 are prepared using instructions in AFLCR/AFSCR 57-3.

The Form 44 (MPA Class V Summary) provides a consolidated summary of the quantities, costs, and schedules for the total Class V modification program. The Form 44 further provides a brief modification description, identifies the related ROC, HQ USAF PMD, responsible AFSC/AFLC engineering agencies, and qualification status of affected equipments. Installation method, schedules, and budget programs/funds by line item are provided by FY. The Form 44 also provides a statement of cost, technical risk, and program recommendations. The Form 44 summarizes the detailed cost and schedule elements contained in the Forms 44A, 44B, and 44C.

The Form 44A (Class V MPA Materiel Acquisition) provides further cost detail for nonrecurring production engineering, trial installation, testing, data, spares, installation, Group A, Group B, and support equipment requirements for the modification. Group A requirements are normally determined by the AFLC SM in conjunction with the aircraft prime contractor. Group B and peculiar support equipment requirements for new equipments are normally provided by the appropriate AFLC IM, in conjunction with the AFSC product division. The general planning factors for initial spares are determined based on predicted equipment reliability and the installation schedule. Though 16 to 20% of installed systems is a commonly used initial spares factor, a low equipment reliability may result in higher spares requirements, and thus an increase in the overall program cost. Initial and replenishment Group B spares computations for Class V modifications are usually determined by the AFLC IM in conjunction with the AFSC product divisions when appropriate.

The Form 44B (Class V MPA Equipment Modification) is used when in-service equipment such as existing Group B or support equipment must be

modified to be compatible with the total Class V modification. Cost, schedules, and installation method by FY for retrofit modification kits are prepared by the responsible AFLC IM, in conjunction with other IMs and the AFSC product divisions as appropriate.

The Form 44C (Class V MPA Development, Testing, and Acquisition) is used to portray the program for development, test, evaluation, and production of new equipment required for a Class V modification. A separate Form 44C is required for each subsystem or item to be developed in support of the modification of Group B, support, mobile training sets, and Class I trainers. The responsible AFSC PMO submits the cost data and lead time to the supporting AFLC item manager and to the SM. The supporting spares and provisioning factors for new items are determined by the AFLC IM in conjunction with the AFSC program office.

Importance of the AFSC PM in Planning the Class V Modification. It was previously noted that lead times for Group B production affect the SM's installation planning; lead time for support equipment determines the initial maintenance training and establishment of organic support posture for the modification. Costs of Group B, support equipment, and technical data usually constitute a major portion of the total program. In general, the higher the reliability and design stability achieved during development, the higher the probability of a successful Class V modification with minimal cost and schedule growth. For those modification programs such as the illustrative example, where management responsibilities are split between major commands, communications and information flow must be smooth and continuous if the modification is to be effectively controlled.

Class V Modification Approval, Funds Flow, and Modification Control.

All Class V modifications require HQ USAF approval. If the ROC remains valid and sufficient funds have been budgeted through the POM exercises and included in the President's budget, HQ USAF will approve the modification by PMD. Class V modification management responsibility will be directed to AFLC or AFSC, as appropriate. For AFLC-managed modifications, the modification management and funds obligation is delegated to the affected SM. Funds for Class V modifications are issued by HQ USAF by Program Authorization and Budget Allocation (PA/BA). In the illustrative example, the Class V modification would be directed to AFLC (OC-ALC) for management, and modification funds allocated through AFLC to the B-52 SM. The B-52 SM, in turn, provides a funded Purchase Request (PR) citing deliverable items on required schedules to the PMO and other affected agencies to support the SM's aircraft modification and installation schedule.

In order to limit modification cost growth, it was noted that cost increases of \$200,000 or greater than 20% of the total modification cost require that the modification be held in abeyance pending HQ USAF direction. Experience has shown that successful prototype demonstrations, adequate qualification, and stable design result in follow-on modifications with minimal cost and schedule growth. There are also several historical examples dramatically illustrating that premature production and installation of subsystems by Class V modifications have resulted in significant cost growth, multiple system configurations, limited operational utility, and poor field support. It is for this reason that

AFLCR 57-21 requires trial installation and qualification of equipment to limit exposure of the modification to cost and schedule growth.

SECTION V

PROBLEM AREAS IN MODIFICATION MANAGEMENT

Interviews were conducted with HQ USAF, AFSC, and AFLC personnel concerning perceptions of and problem areas with the Class V modification process. From these interviews, two relatively separate views of problem areas in modification management were prevalent. A general summary of viewpoints expressed by AFLC personnel interviewed (9, 10, 11, 15) were:

- The AFSC PM, as an advocate of his programs, is primarily concerned with producing and fielding the equipment. For this reason, development and production schedules projected by the PM are almost invariably optimistic, and rather frequently unattainable. In contrast, the logistics aspects of the program are poorly planned and receive low emphasis by the PMO. Poor support planning was generally attributed to the fact that most PMs have had little experience with logistic support activities during their careers. Because of inadequate logistic support planning (especially technical data and support equipment areas) during RDT&E, the resulting support posture for the system is marginal when deployed to field units.

- Overly optimistic development schedules have resulted in curtailed reliability, qualification, and flight test efforts during RDT&E to meet the originally planned and committed schedules for initial deliveries of equipments. Premature fielding of equipments, in turn, requires technical data and equipment configuration changes which are charged as cost growth against the Class V modification program. AFLC is

consequently criticized for poor responsiveness and management. Premature introduction of equipment further limits the range and depth of spares procured until the configuration stabilizes, resulting in degraded support of the deployed system.

- The essential details of modification management are misunderstood or unknown to a substantial number of PMs. This is particularly true in the procurement funds and funds flow area. The AFSC PM is used to spending "one color" (BP 3600) money. Procurement funds for modification are generally tracked by line item within the various budget programs, e.g., BP-1100, BP-1600. Providing funding status of the modification to the SM by the PMO thus requires a new funds reporting procedure for the PM. It was generally acknowledged that part of the PM's problem is caused by similar problems experienced by the contractor with breakdown of the different funds categories required for this reporting.

- It is frequently difficult to obtain more than a cursory logistics assessment of programs during IOT&E as directed by AFR 80-14 because the prototype system is frequently contractor-maintained and the support elements (e.g., AGE, data) are usually unavailable or incomplete. Thus only limited operational suitability objectives can be accomplished prior to initial production. The viewpoint was expressed that AFR 80-14 (3:10) should be restructured or qualified to acknowledge this fact during prototype test programs.

A summary of observations highlighted by AFSC personnel (13, 14) were:

- Improved interface is needed between AFSC, HQ USAF/LG, and AFLC. A principle change needed in this interface is for the development PMD to task AFLC to actively participate in the RDT&E program. Frequently AFLC,

the ALCs, and HQ USAF/LG activities disengage from the RDT&E phases of the program until just before the production decision. Then these same organizations exert their expertise just prior to production and critique the results of R&D. Logistics considerations must be emphasized and agreed upon in the early preproduction planning phase. Lack of AFLC action involvement has frequently resulted in oversight of the maintenance concept and other important support requirements.

- AFLC and the ALCs should more closely monitor and reject PMDs that do not direct AFLC participation during the development effort. HQ USAF and AFLC direction to the newly formed Acquisition Logistics Division will be required for provision of integrated logistics support in the early phases of the RDT&E program. Previously, the ALCs have usually disengaged during the RDT&E phases of AFSC programs.

- The formation of the Acquisition Logistics Division (ALD) was considered by most AFSC personnel as an avenue to earlier AFLC involvement in the RDT&E programs. Future ALD contributions, however, were considered to be highly dependent on personnel available with both development and logistics experience. The viewpoint was expressed that the ALD is getting involved early in the major programs such as the F-15 and F-16, but the same zeal is also needed for smaller programs which are more numerous. This involvement in smaller programs may be realized if the ALD is manned to full strength with appropriate expertise.

- AFSC personnel indicated that large modification programs requiring significant integration or structural modification resulting in a new mission series designation and a new mission for the modified aircraft should be managed by AFSC and require full AFR 800-2 systems

management. Assignment of program management responsibility to AFSC was considered necessary because the development program must be briefed through Congress. Additionally, program control and funds flow for the follow-on modification should not be split between the AFLC SM and the AFSC product divisions for large Class V modifications. The split responsibilities of modification management and funds flow in large programs were considered detrimental because of degraded procurement response time, difficulty in alignment of modification funding by line item and budget program between the AFLC SM and the AFSC PMO, and reporting responsiveness to higher echelons of authority. This split management responsibility was considered significant in large modification since the ALCs were not considered to be sufficiently manned with engineering or procurement expertise to respond in a timely and effective manner to the PM's requirements.

It was generally noted in the interviews conducted that both AFSC and AFLC personnel generally felt it best that AFSC manage large complex modifications involving significant integration and engineering effort, such as the C-5 wing modification and the EF-111 programs, although AFLC and HQ USAF personnel indicated that support responsibilities would be given marginal attention unless improved integrated logistics support was emphasized and directed. One individual expressed the opinion that AFSC really drives those Class V modification programs involving split command management responsibilities since timely submittal of significant information is required from the PMO (see pages 27,28). Further, since the development items constitute the major cost of large complex modification programs, the AFLC SM function in such programs was considered to be relegated to a funds management activity only.

Interviews also highlighted the fact that personnel tended to be development or logistics oriented with little cross breeding, resulting in poor understanding of "the other point of view." There appeared to be a consensus that the same philosophy existed in the Air Staff between HQ USAF/RD and HQ USAF/LG (e.g., HQ USAF/RD personnel follow-on assignments are frequently to AFSC; HQ USAF/LG personnel are frequently reassigned to AFLC). There was general agreement that the using command working level staffs had poor understanding of both AFSC and AFLC management activities. Using command emphasis was considered to be primarily schedule and performance oriented, frequently contributing to premature fielding of modifications because of emphasis to achieve early delivery dates.

SECTION VI

CONCLUSIONS

The Class V modification process is thus seen to be complex and should be well understood by the AFSC PM of less-than-major programs. The illustrative example was one of several that could have been chosen to illustrate the essential steps of the modification process. Results of the interviews have reinforced the author's belief that the early involvement of integrated logistics support activities during RDT&E is becoming increasingly important for effective modification management and planning as modern equipments grow in technical complexity. Additional emphasis on the early and continuing involvement by AFLC agencies in the RDT&E phases of less-than-major systems is indicated. The ALD should provide an improved interface between AFSC, AFLC, and using activities once the ALD becomes fully and appropriately manned.

The existing AFLC organization for accomplishment of Class V modifications can be effective when split management of modifications occurs between the AFLC system manager and the AFSC PMO; however, careful attention to the significant coordination and information flow is mandatory. This study also indicated that either command can be assigned management responsibility for large complex modifications, but an AFSC program office with adequate technical and procurement resources is considered better prepared to manage these large efforts if significant attention is also devoted to integrated logistic support. It appears that large complex modifications such as the C-5 wing modification and the EF-111 are in fact major development and modernization efforts. Such programs may be more

appropriately placed "above the line" in the aircraft procurement account (BP 1000) under AFSC management in lieu of a Class V modification. Additional study is recommended to determine if large complex modifications should be considered as major modernization programs to be placed in "above the line" in lieu of proposed Class V modification programs. Further review of existing Class V modification procedures*is also recommended to determine if improvement in existing management procedures or organization structure is possible.

SECTION VII

RECOMMENDED GUIDELINES FOR THE PM

The following guidelines are recommended to the AFSC PM as a result of this research effort. The guidelines are not all-inclusive, but should aid in the understanding of the requirement for accomplishing the production phase of his program via Class V modification procedures:

- Acquire a general understanding and requirements for the Class V modification process.
- Review AFLC organization structure and the role of the AFLC SM and IM in modification management.
- Determine major command responsibility as soon as practical for large complex modifications that may result in mission designator series change.
- Obtain early AFLC involvement in maintenance and logistics support planning. Review RDT&E program direction to insure AFLC involvement is directed.
- Recognize the total program scope including the importance of configuration control, training, and support requirements for Class V modifications.
- Strive for RDT&E completion (flight, qualification, reliability, and maintainability testing) prior to the production milestone.
- Avoid overly optimistic cost and schedule projections for development and production efforts.

- Understand the basic PPBS, use of different budget program funds for Class V modifications, and importance of timing for budget submissions.

- Be aware of intercommand problems hindering the effective accomplishment of Class V modifications. Guard against a parochial command outlook.

GLOSSARY *

1. Advanced Procurement Plan (APP). The principle long range procurement planning document charting the course of major procurement programs over their life cycle, keyed to the Department of Defense Five Year Defense Program (see ASPR 1-2100).
2. Aerospace Ground Equipment (AGE). For the purpose of this regulation, AGE is all equipment (and its related software) (AFM 11-1) required on the ground to make a weapon system, command and control system, support system, subsystem, or end-item of equipment operational in its intended environment. AGE that is applicable to more than one aircraft or system is classified as common AGE. However, the first AGE package is procured and funded as peculiar AGE (applicable to only one system, conventional munition, or aircraft).
3. Budgetary Cost Information (BCI). Class V modification cost data provided to HQ USAF to assist in development of the Class V modification budget. This information is provided by AFLC or AFSC when requested by HQ USAF. See section C, paragraph 21, basic regulation.
4. Best Preliminary Estimate (BPE). A preliminary technical study prepared by AFLC or AFSC, individually or jointly, in collaboration with ATC and the using commands to provide initial planning, cost, and schedule data for a proposed modification. The BPE is requested by a PMD issued by HQ USAF. The BPE is also prepared to provide this cost and schedule data

* Extracted from AFR 57-4, Attachment 1

automatically in response to Combat Required Operational Capabilities (Combat ROCs) under the provisions of AFR 57-1. The BPE is used when a quick response to urgent requirements for cost and schedule information is necessary.

5. Configuration Change. A change in the physical or functional characteristics of a CI. Configuration changes are accomplished during production (production change) or after delivery (retrofit change). (See explanations of retrofit changes in paragraph 25).

6. Configuration Identification. The current approved or conditionally approved technical documentation for a configuration item as set forth in specifications, drawings and associated lists, and documents referenced in them.

7. Configuration Item (CI). (See AFR 65-3). An aggregation of hardware or software, or any of its discrete portions, that satisfies an end use function and is designated by the Government or configuration management. CIs may vary widely in complexity, size, and type--from an aircraft or electronic system to a test meter or round of ammunition. During development and initial production, CIs are only those specification items that are referenced directly in a contract (or an equivalent in-house agreement). During the operational and maintenance period, any reparable (nonexpandable) item designated for separate procurement is a configuration item. In this regulation, "CI" and the term "system/equipment/conventional munition/computer program" are synonymous. The term includes:

a. Government furnished equipment (GFE), contractor furnished equipment (CFE), and spares.

b. USAF centrally procured, privately developed items, including commercial off-the-shelf equipment, AGE, and training equipment.

c. Air Force-owned Automatic Data Processing (ADP) equipment, computer controlled equipment and their associated software and software documentation, when these are either physically incorporated into a weapon or integral to a weapon system from design or procurement viewpoints.

8. Configuration Management. A discipline that applies technical and administrative direction and surveillance to:

a. Identify and document the functional and physical characteristics of a configuration item.

b. Control changes to the above characteristics.

c. Record and report change processing and implementation status.

9. Deficiencies. There are two types of deficiencies (See AFR 65-3 or MIL STD 480):

a. Conditions or characteristics in any hardware or software that are not in compliance with specified configuration.

b. Inadequate (or erroneous) configuration identification that has resulted, or may result, in configuration items that do not fulfill approved operational requirements.

10. Engineering Change. An alteration in the configuration of a CI or an item (delivered, to be delivered, or under development) after formal establishment of its configuration identification.

11. Engineering Change Proposal (ECP). A proposed engineering change and the documentation that describes and suggests it (MIL-STD 480 and 481 apply).

12. Firm Class V Modification. A USAF-approved Class V modification for which implementation and funding actions have been directed.

13. Group "A" Kit. The items, parts, or components to be permanently or semipermanently installed in a CI to support, secure, interconnect, or accommodate the equipment provided in the retrofit change Group B kit.

14. Group "B" Kit. The equipment which, when installed in a CI with a Group "A" Kit, completes a retrofit change. Normally, Group B items are removable.

15. Item Manager (IM). The AFLC ALC with management responsibility for commodity-type items by Federal Supply Class (TO 00-25-115), or the commodity manager of another service or the Defense Supply Agency, such as the 1155th Technical Operations Squadron (AFTAC) that acts as the IM for the Air Force Technical Applications Center (AFTAC).

16. Kit Proofing and TCTO Verification. The actual trial installation, in accordance with the proposed TCTO, of the first production updating change or modification kit before release of normal quantities to the installing activities (TO 00-25-233). The purpose of kit proofing is to determine that kit parts are adequate and fit correctly, that technical instructions are correct, that skill levels required for the installation are correct, that special tooling is adequate, and that kits can be installed at the maintenance level prescribed by the TCTO in the intended installation environment. TCTO verification also applies to TCTOs that are issued without supporting kits. The using command will accomplish this function if organizational or intermediate level assignment is planned. Kit proofing is in addition to the test and evaluation of the prototype kit by the command responsible for the kit engineering.

17. Modification Proposal and Analysis (MPA). A comprehensive technical study and cost and schedule analysis that considers all aspects of a

proposed Class V modification. It is prepared at the direction of HQ USAF by AFLC or AFSC individually, or jointly, in collaboration with ATC and the using commands. Its purpose is to evaluate, plan, and program all aspects of a proposed Class V modification. The MPA is requested by a PMD issued by HQ USAF on AF Form 71. Additional supplemental data may be added as deemed necessary to address the management aspects of the proposed modification. The MPA (and BPE if requested) is the only document that may be used to transmit cost and schedule data for evaluation of a proposed Class V modification. Cost and schedule data provided in the form of a BCI cannot be used to gain approval of a Class V modification. A BPE or MPA is necessary.

18. Modification Planning Supplement (MPS). An MPS is documentation to supplement the MPA on high risk or cost modifications (see table 1 and paragraph 20 of AFR 57-4).

19. Product Base Line. The initially approved or conditionally approved product configuration identification (see AFR 65-3).

20. Production Change. A configuration change to a CI effected during production. The same change incorporated into delivered units would be accomplished by a retrofit change.

21. Program Management Directive (PMD). The official HQ USAF management directive that provides direction to the implementing command and is used exclusively during the entire acquisition cycle. It will be used to state requirements, request studies and analyses, develop, initiate, approve, change, transition, modify, or terminate programs. Specifically, the PMD will be used to direct documentation needs for advocacy, development, production, and system or equipment modification programs using RDT&E or

procurement funds. The content of the PMD, including the program control to be exercised by HQ USAF, is tailored to the needs of each individual program.

22. Retrofit Change. A configuration change that is accomplished after production delivery. The term includes modifications and updating changes.

a. Modification. A change which:

(1) Is temporary and necessary to accomplish a special mission for a special purpose;

(2) Satisfies a requirement for testing or production continuity;

(3) Corrects a deficiency revealed after transfer of retrofit change responsibility from AFSC to AFLC; or

(4) Satisfies a requirement for a new capability that is determined after the CI product base line has been established (see AFR 65-3).

b. Updating Change. A retrofit change to a CI for which a requirement is revealed before retrofit change responsibility is transferred from AFSC to AFLC. These requirements, including deficiencies (see paragraph 8 this appendix, AFR 65-3, or MIL STD 480), can be revealed during production, operational use, Category II system testing, or other testing, (such as equipment "Category III-equivalent" testing (AFR 80-14), conducted by mutual agreement of AFSC, AFLC, and the using command instead of but with the same objectives as Category II testing when Category II testing by AFSC is not practical or feasible). The requirement can be discovered by any agency; the source does not determine its classification as an updating change. Retrofit changes that primarily provide a new or improved capability after the product base line is established are Class V modifications, not updating changes.

c. Retrofit changes to the following Air Force CIs are not governed by this regulation:

(1) Standard, commercially available ADP equipment for use in management, R&D, and operations support functions, including both the computers and the computer programs.

(2) Fixed ground communications-electronic-meteorological facilities programmed under AFM 100-18, unless such changes require configuration changes to a CI to maintain the proper equipment interface.

(3) Real property installed equipment (RPIE) (AFR 400-41).

(4) Industrial plant equipment (IPE).

(5) Communication security equipment governed by AFR 66-21.

23. System Manager (SM). The AFLC ALC with management responsibility for selected systems (TO 00-25-115).

24. Tentative Class V Modification. A proposed Class V modification that has been validated by HQ USAF and for which AFLC or AFSC has forwarded a completed BPE or MPA to HQ USAF.

25. Updating Change-Modification Transfer Agreement. A formal agreement between the AFSC SPO, PO, or equipment acquisition organization and the AFLC SM or IM covering the transfer of retrofit change responsibility for a system or equipment item from AFSC to AFLC following the termination or completion of Category II testing.

CLASS V MODIFICATION PROPOSAL AND ANALYSIS (MPA) MATERIEL ACQUISITION							1. Date	
2. Title						3. Systems/Equipment		
4. Numbers		Combat		5. Type of Study		<input type="checkbox"/> Acquisition <input type="checkbox"/> Post Acquisition		
Modification No.		ROC No.		<input type="checkbox"/> Basic <input type="checkbox"/> Rev. No.				
Reqs Action Directive No.		ROC No.						
6. Prepared By:								
7. Costs shown for materiel and services are based on								
<input type="checkbox"/> A Best Preliminary Estimate <input type="checkbox"/> A Detailed Study of Factual Documentation								
8. Costs estimated herein must be revalidated if the modification is not approved by:								
9. ACQUISITION REQUIREMENTS AND COSTS								
A	B	C	D	E	F	G	H	I
Item	Budget Program	Lead Time	Unit Cost	FY	FY	FY	FY	TOTAL
GROUP A								
10. Engineering								
11. Prototype								
12. Testing								
13. Proofing								
14. Data								
15. Mod Kit Cost								
16.								
17. Initial Spares Cost (%) Inv.								
18. Initial Spares Cost (%) Exp.								
19.								
20.								
21. Installation Cost (C)								
22. Installation Cost (D)								
23. FY Total								
24. Mod Kit Qty								
GROUP B								
25. Engineering								
26. Testing								
27. Data								
28. Mod Kit Cost								
29.								
30. Group B Spares Cost (%) Inv.								
31. Group B Spares Cost (%) Exp.								
32. Group B M&O Inv.								
33. Group B M&O Exp.								
34. Bench Mock-Up								
35.								
36.								
37. FY Total								
38. Mod Kit Qty								
AGE REQUIREMENTS (PECULIAR-SINGLE APPLICATION)								
39. Engineering								
40. Testing								
41. Data								
42. Equip (End Items)								
43.								
44.								
45.								
46.								
47. Initial M&O Parts Cost (%) Inv.								
48. Initial M&O Parts Cost (%) Exp.								
49. FY Totals								
AGE REQUIREMENTS (PECULIAR-MULTIPLE APPLICATION)								
50. Equip (End Items)								
51.								
52.								
AGE REQUIREMENTS (COMMON)								
53. Equip (End Items)								
54.								
55.								

[illegible]

CLASS V MODIFICATION PROPOSAL AND ANALYSIS (MPA) DEVELOPMENT, TESTING AND ACQUISITION									
<input type="checkbox"/> Group B <input type="checkbox"/> AGE					<input type="checkbox"/> Mobile Training Sets <input type="checkbox"/> Class I Trainers				
1. Title						2. Systems/Equipment			
3. Numbers Modification No. Reqm'ts Action Directive No.					Combat ROC No. ROC No.		<input type="checkbox"/> Acquisition <input type="checkbox"/> Post Acquisition		
4. Type of Study					<input type="checkbox"/> Basic <input type="checkbox"/> Revision (No.)				
5. Prepared by (Command and Symbol)									
6. Cost Shown for Material and Services is Based on									
<input type="checkbox"/> A Best Preliminary Estimate					<input type="checkbox"/> A Detailed Study of Factual Documentation				
7. Cost estimates herein must be revalidated if the modification is not approved by									
DEVELOPMENT, TESTING AND ACQUISITION									
A Item	B Lead Time	C Comd	D Source	E FY	F FY	G FY	H FY	I Total Cost	
Development									
Testing									
Production									
Data									
DEVELOPMENT PROGRAM									
9. Item to be Developed and Technical Description									
10. Development Plan									
11. Degree of confidence placed in success of Development Program..... %.									
TEST PROGRAM									
12. Item to be Tested (Nomenclature/Spec Number/Part Number)									
13. Test Director (Command)					14. Participating Agencies				
15. Test Site					16. Duration of Test				

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4. AFLCR/AFSCR 57-3, Class V Modification Management. HQ AFLC, Wright-Patterson AFB, Ohio; HQ AFSC, Andrews AFB, MD, 30 December 1970.
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8. Department of Defense Instruction Number 7045.7, The Planning, Programming, and Budgeting System. Washington, D. C., 29 October 1969.
9. Benjamin, George, Colonel, USAF. Interview on 18 March 1977. Colonel Benjamin is the Director of Aerospace Systems at HQ AFLC, Wright-Patterson AFB, Ohio. He has extensive knowledge and experience with Class V modification procedures and policy.
10. Goforth, Charles L., Colonel, USAF. Interview on 18 March 1977. Colonel Goforth is Chief, Electronic Warfare and Equipment Division, HQ AFLC, Wright-Patterson AFB, Ohio. He has extensive maintenance and logistics experience.
11. Huffman, James R. Interview on 1 March 1977. Mr. Huffman is a section chief in the Airborne Radar and Equipment Item Management Division, Warner Robins ALC, Robins AFB, GA. He has extensive knowledge of AFLC item management responsibilities.
12. Huffman, Leon, Lt Colonel, USAF. Interviews on 9, 20 April 1977. Lt Col Huffman is a HQ USAF/LGYY program officer for Class V modifications and has considerable knowledge of Class V modification policy and previous AFLC experience with Class V modification programs.

13. Monahan, Arthur E., Colonel, USAF. Interview on 4 April 1977. Colonel Monahan is the Director of Reconnaissance and Electronic Warfare, HQ AFSC, Andrews AFB, Md. He has had considerable AFSC experience in system program offices and Class V modification programs.
14. Rogers, Ross H., Colonel, USAF. Interview on 18 March 1977. Colonel Rogers is the Program Director for the F-4G Wild Weasel Program, Class V modification 2740, at ASD, Wright-Patterson AFB, Ohio.
15. Romstad, Terry, Major, USAF. Interview on 25 February 1977. Major Romstad is the modification manager for the F-4G Wild Weasel Program in the F-4 System Management Division, Ogden ALC, Hill AFB, Utah.
16. (Unnumbered Booklet), The Air Force Budget, Office of the Comptroller, Department of the Air Force, February 1976.